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DOI: https://doi.org/10.1007/s12144-020-00629-z

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The authors would like to thank Fabian Gander for helpful comments regarding an earlier version of the manuscript.

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Abstract

In this study, we sought to locate the three traits known as the temperamental basis of humor (*cheerfulness*, *seriousness*, and *bad mood*) in the personality space defined by the five-factor model in adolescents. The study also investigated the relative contribution of these narrower traits – in comparison to broad personality traits – to explaining variance in relevant outcomes: the frequency of humor behaviors and well-being. A sample of $N = 379$ adolescents aged 10 to 17 years (mean age = 15.52, 28.5% male) completed questionnaires on the traits of *cheerfulness*, *seriousness*, and *bad mood* (STCI-youth), the personality traits of the five-factor model (IPIP-junior), the frequency with which they typically displayed 13 different humor behaviors (HUMOR), and well-being (PWI-SC). The results reveal that all three traits assessed by the STCI-youth predicted unique variance in both the frequency of humor behaviors and well-being – beyond demographic variables, the personality traits of the five-factor model, and each other. Using dominance analysis, we demonstrate that the variables assessed by the STCI-youth – in particular, *cheerfulness* and *seriousness* for humor behaviors and *cheerfulness* and *bad mood* for well-being – outperform broad personality traits in accounting for the variance in humor behaviors. In conclusion, the present study show that *cheerfulness*, *seriousness*, and *bad mood* overlap with broad personality traits, while being unique predictors of everyday humor behaviors and well-being. Thus, they are well-suited for investigating individual differences in the domain of humor among adolescents.

Keywords: Cheerfulness, Seriousness, Bad mood, Dominance analysis, Five-factor model, Broad vs. narrow traits

The traits of *cheerfulness*, *seriousness*, and *bad mood* outperform the five-factor model in explaining variance in humor behaviors and well-being among adolescents

Introduction

Individuals differ substantially in their reactions to humor in their daily lives – both inter- and intra-individually (e.g., Ruch & Hofmann, 2012). Ruch, Köhler, and van Thriel (1996) proposed a temperamental basis of humor; that is, the states and traits of *cheerfulness*, *seriousness*, and *bad mood*, which represent attitudinal, emotional, and cognitive differences and, together, predispose individuals to show amusement and exhilaration. The three states interact in predicting a response to a given situation and they vary substantially across different situations, while the three traits explain individual differences in habitual behavior. In the present study, we sought to identify whether the traits representing the temperamental basis of humor relate to individual differences in (a) the frequency of typical humor behaviors and (b) global well-being in adolescents above the influence of broad personality traits (i.e., traits described in the five-factor model, e.g. McCrae & Costa, 1987). In this way, we sought to establish the incremental validity of these narrower traits (temperamental basis of humor) with regard to two relevant outcomes.

The state-trait model of *cheerfulness*, *seriousness*, and *bad mood*: the temperamental basis of humor

To account for individual differences in reactions to humor, extraversion was among the first variables to be examined, as this trait has been linked to stronger reactions following induction of positive mood (Larsen & Ketelaar, 1989). Extraversion has also been associated with laughter propensity (Ruch, 1990). A closer look at these and other results, however, revealed that some facets of extraversion and of positive mood had much stronger relationships with reactions to humor than others. Ruch (1990) concluded that a narrowly defined construct such as *cheerfulness* (both the trait and the state) would be the most powerful predictor of actual and habitual exhilaration; that is, the emotion typically elicited

by humor. State and trait *cheerfulness* are thought to facilitate the induction of exhilaration, while a serious frame of mind and a prevalent *bad mood* heighten the threshold for inducing exhilaration (Ruch et al., 1996). *Cheerfulness* and *bad mood* are conceptualized as negatively correlated, distinct, affective components, while *seriousness* is a cognitive or attitudinal trait.

In addition to a general prevalence of cheerful mood, *cheerfulness* sets a low threshold for laughter and smiling, as well as a composed view of adverse circumstances; a wide range of elicitors of cheerful mood, smiling, and laughter; and a cheerful style of interaction with others (Ruch et al., 1996). Together, these facets represent a state and trait that can be described as readiness to respond to appropriate stimuli with smiling and/or laughter. Seriousness encompasses the prevalence of serious states, a thorough consideration of everyday events that are also considered highly important, a tendency to set longer-term goals and to plan before acting, a preference for activities that follow clear and rational goals, a sober communication style, and a generally "humorless" attitude (Ruch et al., 1996). Finally, *bad mood* encompasses, in addition to general *bad mood*, sadness, and ill-humor, which is reflected in attitudes and behaviors (Ruch et al., 1996).

The *State-Trait Cheerfulness Inventory* (STCI; Ruch, et al., 1996) was developed to assess *cheerfulness*, *seriousness*, and *bad mood*, both as current states and habitual traits. Its reliability and validity have since been evaluated in many studies (e.g., Carretero-Dios, Eid, & Ruch, 2011; Hofmann, Carretero-Dios, & Carrell, 2018; Ruch & Köhler, 1998). Studies using the STCI have demonstrated that the traits of *cheerfulness*, *seriousness*, and *bad mood* (a) are clearly distinguishable constructs with a stable pattern of intercorrelations (see Ruch & Hofmann, 2012, for an overview); (b) explain much of the variance in scales assessing the sense of humor (Köhler & Ruch, 1996; Ruch & Carrell, 1998); (c) predict a range of behaviors in experiments, such as reactions to emotion-inducing videos (López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2018) or pain tolerance (Zweyer, Velker, & Ruch,

2004); (d) can moderate the effects of humor-related interventions (e.g., Auerbach, 2017; Hirsch, Junglas, Konradt, & Jonitz, 2010); and (e) show a high convergence with the respective aggregated states (Carretero-Dios et al., 2011).

Temperamental basis of humor and broad personality traits

Given that the traits of *cheerfulness*, *seriousness*, and *bad mood* represent narrowly defined individual differences, they can be located in the nomological network of broader personality traits. The results of several previous studies (Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014; Lau, Chiesi, Saklofske, & Yan, 2019; Ruch & Köhler, 1998; Wrench & McCroskey, 2001), using different measures of personality and diverse samples, all converge fairly well: *cheerfulness* is consistently associated with high extraversion, low neuroticism/high emotional stability, and high agreeableness. This pattern of correlations is reversed for *bad mood* (low extraversion, low emotional stability, low agreeableness), with a trend towards a stronger contribution of neuroticism. Bad mood also tends to be associated with low conscientiousness and low openness. Seriousness yields the most consistent associations with high conscientiousness and tends to be related to low extraversion.

Studies using methods other than correlating the STCI directly with measures of broad personality traits have yielded similar results. For instance, *cheerfulness* has been found to be positively related to self-reported interpersonal competence, which can be linked to agreeableness, with a negative correlation identified for *bad mood* (Yip and Martin, 2006). Heintz (2017) analyzed the dimensionality of daily reported humor behaviors. “Cheerful humor” (described as a general tendency to show humor behaviors) was one dimension identified, and the manifestation of these behaviors more frequently over the course of five days was associated with higher levels of extraversion and emotional stability. The present study extends previous research on adults by locating the temperamental basis of humor in

the nomological of the five-factor model of personality in a sample of adolescents, using the youth version of the STCI.

Broad personality traits and humor-related traits as predictors of humor behavior

Both broad personality traits and the traits assessed by the STCI have been investigated as predictors of a variety of humor behaviors. An emphasis has been placed upon the relationship between extraversion and smiling/laughing (see also Ruch & Deckers, 1993). However, Heintz (2017) concludes that all personality traits in the five-factor model, with the exception of conscientiousness, are related to the frequency of showing (certain aspects of) humor behaviors in daily life, while the strength of the relationships varies substantially depending on the types of humor behaviors considered.

As noted previously, early studies found *cheerfulness* to be a better predictor of a favorable reaction to humor stimuli than extraversion, but *seriousness* and *bad mood* were also deemed relevant for predicting humor behaviors. For instance, Ruch and Carrell (1998) demonstrated that all three traits explained variance in the sense of humor scale (McGhee, 1996). The traits of *cheerfulness*, *seriousness*, and *bad mood* were also found to explain variance in humorous conduct – when assessed both globally (Ruch, Proyer, Esser & Mitrache, 2011) and multidimensionally (i.e., when considering different forms of humor behavior, such as mean-spirited/earthy, entertaining, inept, laughter; Ruch & Heintz, 2019) – and in humor production (Ruch & Köhler, 1998). The roles of *cheerfulness*, *seriousness*, and *bad mood* are postulated to be independent of the particular content of the humor, which is supported by the Heintz (2019) findings demonstrating the relevance of STCI traits across eight different comic styles, including fun, wit, and satire (Ruch, Heintz, Platt, Wagner, & Proyer, 2018).

The present study responds to recent calls in the literature to "[investigate] the incremental validity of the *State-Trait Cheerfulness Inventory* in the prediction of humor

related outcomes when controlling for broader personality traits (i.e., the 'Big Five,' especially extraversion)" (Hofmann et al., 2018, p. 13). Since the early observations, it has rarely been tested whether the temperamental basis of humor indeed performs better at predicting humor behavior than broad personality traits. To our knowledge, the only exception is one study conducted in an experimental setting, in which *cheerfulness* showed incremental validity above extraversion in predicting facial displays of exhilaration, while extraversion showed no incremental prediction above *cheerfulness* (Ruch, 1997). Although this evidence is convincing, it is limited to a specific experimental setting and it is unclear to what extent these findings extend to habitual humor-related behavior. In addition, other dimensions besides extraversion seem to play a role in predicting the frequency of humor behaviors (e.g., Heintz, 2017); thus, it is advisable to include all personality traits of the five-factor model when testing for incremental validity of the temperamental basis of humor. An age-appropriate measure for adolescents was needed, and we chose the *Humor use in multiple ongoing relationships* (HUMOR) scale (Manke, 2007), as adapted by Ruch et al. (2011), to globally assess everyday humor-related behaviors in adolescents.

Temperamental basis of humor and well-being

Cheerfulness, *seriousness*, and *bad mood* have also been linked with a number of well-being outcomes (for an overview, see Ruch & Hofmann, 2012). Cheerfulness is assumed to contribute to well-being via several pathways. First, the trait of *cheerfulness* might contribute to the robustness of a cheerful mood: individuals high in the trait of *cheerfulness* are assumed to (1) more easily achieve a cheerful mood, experience (2) longer and (3) more intense cheerful moods, (4) remain cheerful when faced with adversity, and they are assumed (5) to recover more quickly from negative moods (see Ruch & Hofmann, 2012; Ruch & Köhler, 1998, 1999).

In fact, individuals high in *cheerfulness* report higher levels of life satisfaction (Carretero-Dios et al., 2014; Ruch et al., 2011), happiness, hope, and health, as well as lower levels of anxiety and depression (Carretero-Dios et al., 2014). In addition, *cheerfulness* has been linked with adaptive coping strategies (Ruch & Zweyer, 2001). By contrast, the trait of *bad mood* has been linked with poor well-being, showing a pattern of results opposite to that of *cheerfulness* (Carretero-Dios et al., 2014; Ruch et al., 2011). Seriousness has not emerged as strongly related to well-being.

Clearly, however, broad personality traits also account for a substantial amount of the variance in various measures of well-being. This overlap can be as high as 40-60% (for overviews, see e.g., Steel, Schmidt, & Shultz, 2008; Strickhouser, Zell, & Krizan, 2017). These relationships have also been seen in samples of adolescents (e.g., Weber & Huebner, 2015). Therefore, it is important to identify the incremental validity of the traits assessed by the STCI for predicting well-being beyond the influence of broad personality traits.

Aims of the present study

The aims of the present study were threefold: (1) to locate adolescents' traits of *cheerfulness*, *seriousness*, and *bad mood* in the nomological network defined by the five-factor model of personality, and (2) to determine the absolute and relative contributions of the temperamental basis of humor (*cheerfulness*, *seriousness*, and *bad mood*) and the personality traits of the five-factor model in explaining variance in the frequency of everyday humor behaviors and (3) well-being.

Regarding (1), we built on previous results (e.g., Carretero-Dios et al., 2014; Ruch & Köhler, 1998) to hypothesize that *cheerfulness* would be related to high extraversion, high emotional stability, and high agreeableness. Seriousness was expected to correlate with low extraversion and high conscientiousness, and *bad mood* with low extraversion, low emotional stability, and low agreeableness.

Regarding (2), we hypothesized – based on previous findings concerning adults (Ruch et al., 2011) – a positive relationship with *cheerfulness* and a negative relationship with *seriousness*, and predicted that *bad mood* would be mostly unrelated to the frequency of display of humor behaviors. However, we also expected varying contributions for the three traits to explaining variance in the specific behaviors; that is, that some behaviors would be better predicted by high *cheerfulness* and others by low *seriousness*. In addition, we expected both *cheerfulness* and *seriousness* to explain more variance in humor behaviors than the personality traits of the five-factor model.

Regarding (3), we hypothesized that the trait of *cheerfulness* would be positively related to well-being, the trait of *bad mood* negatively related, and the trait of *seriousness* to have no meaningful relationship with it. Furthermore, we expected these relationships to exist beyond the influence of the broad personality traits described by the five-factor model of personality. Studying these relationships in a sample of adolescents enabled us to establish the incremental validity of the recently developed youth version of the STCI (Ruch, Wagner, Platt, Hösli, & Sommer, 2020) for two of the most firmly established correlates of the temperamental basis of humor: humor behaviors and well-being.

Method

Participants

The sample size was determined based on considerations of statistical power, using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). To detect a medium-sized effect (according to Gignac & Szodorai, 2016) of $r = .20$ (two-tailed) with a power of ß = .80 and an α level of .001, a sample of at least $N = 379$ participants was required. We analyzed the data of 382 participants, and excluded $n = 3$ from further analysis because they had selected the same response options in more than 90% of the answers for one or more of the measures. Thus, the sample comprised $N = 379$ participants (28.5% male, 71.5% female). They had an

average age of 15.52 years old (*SD* = 1.51, range: 10 to 17 years). The majority of the participants indicated a German (45.9%), Swiss (33.0%), or Austrian (8.2%) nationality. All had spoken German for at least three years, and 93.4% indicated that it was their native language.

Instruments

The trait version of STCI-youth (Ruch et al., 2020) was used to assess *cheerfulness*, *seriousness*, and *bad mood*. Age-appropriate items for the assessment of the three traits in children and young people, aged 10-17 years, were generated, selected, and validated. The questionnaire consists of 30 items, with a four-point response scale (from 1= "strongly disagree" to 4 = "strongly agree"). Sample items are, "It is easy for me to spread good cheer" (*cheerfulness*), "I am a serious person" (*seriousness*), and "I am more of a sad person" (*bad mood*). In the present study, scales yielded internal consistency coefficients of α = .88 (*cheerfulness*), α = .71 (*seriousness*), and α = .92 (*bad mood*).

IPIP-junior (Mlačić, Milas & Kratohvil, 2007; German version by Ostendorf & Rahlfs, 2009) was used to assess the personality traits of the five-factor model. This consists of 50 items, which are part of the international personality item pool, some of which were adapted for use with adolescents. The IPIP-junior uses a five-point response scale (from 1 = "completely disagree" to 5 = "completely agree"). A sample item is "I feel comfortable around people" (extraversion). Previous studies (e.g., Mlačić et al., 2007) have found substantial convergence between self-reports and parent reports and a clear factorial structure. In the present sample, the scales yielded internal consistency coefficients of α = .87 (extraversion), α = .87 (agreeableness), α = .85 (conscientiousness), α = .90 (emotional stability), and α = .83 (intellect/imagination).

A variation of HUMOR (see Manke, 2007), consisting of 13 items, as previously used by Ruch et al. (2011) was employed to assess the frequency with which everyday humor

behaviors were displayed. That is, unlike in the original use by Manke et al. (2007), participants reported on their general tendency to show these behaviors, irrespective of their interaction partner. Participants used a five-point response scale (ranging from 1 = "never" to 5 = "all the time") to indicate how frequently they typically engaged in everyday humor behaviors (e.g., "I tell funny stories about things that have happened to me"). The 13 items were averaged to give a total score representing the frequency of everyday humor behavior, which yielded an internal consistency of $\alpha = .80$.

A German translation of the *Personal well-being index – school children* (PWI-SC; Cummins & Lau, 2005) was used to provide a global assessment of well-being. The PWI-SC consists of seven items pertaining to satisfaction with different aspects of life (standard of living, health, achievement, relationships with family and friends, safety, community, and the future), all of which have been shown to explain variance in global life satisfaction (Tomyn & Cummins, 2011). Participants used an 11-point response scale (ranging from 1 = "very dissatisfied" to 11 = "very satisfied"). In the present study, the scale yielded an internal consistency of $\alpha = .86$, which is comparable to the consistency of .82 reported for the English-language version (Tomyn & Cummins, 2011).

Procedure

Participants completed the instruments on a webpage designed for the public to complete questionnaires on various constructs studied in personality psychology and to receive automated feedback on their individual results. This website (https://www.charakterstaerken.org) is affiliated with an institution of higher education, and its questionnaires can be completed free of charge. For the present study, we analyzed data from participants aged 10-17 years old, who had completed the STCI-youth, the IPIP-junior, HUMOR, and the PWI-SC. Informed consent was obtained from each participant, and they

were additionally asked to indicate whether their parents or legal guardians had consented to their participation.

Data analysis

To address the first aim of the present study (locating the temperamental basis of humor in the nomological network of personality), the partial correlations of the traits of *cheerfulness*, *seriousness*, and *bad mood* with the personality traits of the five-factor model (controlling for influences of age and sex) were computed. In addition, we sought to determine the amount of variance explained by the five personality traits together (after controlling for influences of demographic variables). For this purpose, we computed three hierarchical regression analyses (separately for *cheerfulness*, *seriousness*, and *bad mood*, as assessed by the STCI-youth, as dependent variables), in which age and sex were entered in the first step and all five variables measured by the IPIP-junior in the second (method = enter).

To address the study's second (determining the relative contributions of the temperamental basis of humor and the personality traits of the five-factor model to explaining variance in the frequency of everyday humor behaviors) and third aim (determining their relative contributions to explaining variance in well-being), three analyses were conducted for each outcome variable. First, the partial correlations of the SCTI-youth and IPIP-junior variables with both outcome variables (controlling for influences of age and sex) were computed. Second, to determine whether the variables assessed by the STCI-youth explained incremental variance in the outcomes above the personality traits of the five-factor model, we conducted a hierarchical regression analyses with demographic variables (age and sex) entered in the first step; personality traits of the five-factor model (assessed by the IPIP-junior) in the second; and the traits of *cheerfulness*, *seriousness*, and *bad mood* in the third, both for each trait individually and as an additional analysis, with all three traits entered

simultaneously (method = enter). Finally, we conducted a dominance analysis (see Azen & Budescu, 2003; Budescu, 1993) to examine and compare the explained variance in all possible subsets of the predictors to determine the relative importance of each of the predictors in a multiple regression. The dominance analysis was computed using the "yhat" package (Nimon & Roberts, 2013) in R (R Core Team, 2013). For the interpretation of effect sizes, we relied on the guidelines of Gignac and Szodorai (2016) for research on individual differences. To adjust for the effects of multiple comparisons, we used an α level of .001.

Results

Descriptive analyses

Descriptive statistics for all scales, internal consistency coefficients (Cronbach's α and McDonald's ω), and correlations with age and sex are displayed in Table 1.

Insert Table 1 about here

As shown in Table 1, there were small correlations with demographic variables. As a consequence, we controlled for age and sex in subsequent analyses. Table 2 shows the intercorrelations between the STCI-youth and IPIP-junior scales, as well as the correlations between the SCTI-youth scales, IPIP-junior scales, and the PWI-SC.

Insert Table 2 about here

As shown in Table 2, there were medium-sized relationships between *seriousness* and *cheerfulness* (negative) and *seriousness* and *bad mood* (positive), as well a strong negative correlation between *cheerfulness* and *bad mood*. The personality traits of the five-factor model, as measured by the IPIP-junior, showed primarily medium to strong positive intercorrelations.

***Cheerfulness*, *seriousness*, and *bad mood* in relation to the personality traits of the five-factor model**

As shown in Table 2, the trait of *cheerfulness* was positively correlated with extraversion, emotional stability, and agreeableness (large effect sizes), as well as with conscientiousness (small effect size). Seriousness was predicted by high conscientiousness and low extraversion, but unrelated to the remaining personality traits. Bad mood displayed a strong negative correlation with emotional stability, extraversion, conscientiousness, and agreeableness. Regression analyses revealed that all five personality traits together explained 46.0% of the variance in the trait of *cheerfulness*, 25.8% in the trait of *seriousness*, and 56.0% in the trait of *bad mood*, beyond influences of age and sex.

Relative contribution of STCI-youth and IPIP-junior in explaining variance in the frequency of everyday humor behaviors

The correlations between the studied traits and the frequency of everyday humor behaviors are presented in Table 3.

Insert Table 3 about here

As shown in Table 3, in line with our expectations, the frequency of most single humor behaviors –as well as the total score across all behaviors – was associated with higher traits of *cheerfulness* and lower of *seriousness*. One humor behavior ("I laugh and joke as a way to avoid talking about something that is bothering me") was positively related to *bad mood*, while the remaining behaviors were unrelated to this trait. Most humor behaviors – and the total score – were positively related to extraversion. The mean score also showed a negative correlation with conscientiousness, but only three of the single humor behaviors were significantly related. Furthermore, one humor behavior was also negatively related to emotional stability, and two behaviors were positively related to agreeableness.

In the next stage, we performed a hierarchical regression analysis (method = enter, total R^2 = .36, total adj. R^2 = .35), with demographic variables entered in the first step (ΔR^2 = .01, $p > .05$); personality traits of the five-factor model in the second step (ΔR^2 = .19, $p <$ .001); and the traits of *cheerfulness*, *seriousness*, and *bad mood* in the third step (ΔR^2 = .17, $p <$ .001). All three traits assessed by the STCI-youth contributed significantly to the incremental prediction of the frequency of humor behaviors: *cheerfulness* (β = .50, $p <$ .001), *seriousness* (β = -.28, $p <$ .001), and *bad mood* (β = .24, p = .003). When the second and third steps of the regression analysis were reversed (i.e., the IPIP-junior scales entered last), the personality traits of the five-factor model explained a unique variance in the frequency of humor behaviors of 4.1% (vs. 17.0% of the unique variance explained by the STCI-youth traits). Thus, 15.3% of the variance in the frequency in humor behaviors was shared between the STCI-youth and IPIP-junior scales.

We also conducted three separate regression analyses, with demographic variables entered in the first step, personality traits of the five-factor model in the second, and one of the SCTI traits (*cheerfulness*, *seriousness*, and *bad mood*, respectively) in the third. The individual traits all predicted the frequency of humor behaviors beyond demographics and personality traits (*cheerfulness*: β = .47, ΔR^2 = .11, $p <$ .001; *seriousness*: β = -.34, ΔR^2 = .08, $p <$ .001; *bad mood*: β = -.20, ΔR^2 = .02, p = .006). To determine the relative importance of the single predictors, a dominance analysis was conducted. The results are presented in Table 4.

Insert Table 4 about here

As shown in Table 4, the greatest variance in the total frequency of humor behaviors was explained by the trait of *cheerfulness* (10.7%), followed by those of *seriousness* (10.5%) and extraversion (4.8%). Taken together, the three STCI-youth traits explained almost twice

the amount of variance (23.0%) compared to the five personality traits (11.9%). With two exceptions, the traits assessed by the STCI-youth also explained greatest variance in the frequency of single humor behaviors, though the humor behaviors differed with regard to which predictor was the most important. In six cases, the trait of *cheerfulness* explained most variance; in four cases, *seriousness*, and in one case, *bad mood*.

Relative contribution of STCI-youth and IPIP-junior to explaining variance in well-being

As expected, *cheerfulness* showed a strong positive correlation with well-being, and *bad mood* a strong negative correlation, while *seriousness* was unrelated (see Table 2). We again performed a hierarchical regression analysis (method = enter, total $R^2 = .50$, total adj. $R^2 = .48$), with demographic variables entered in the first step ($\Delta R^2 = .04$, $p < .001$); personality traits of the five-factor model in the second ($\Delta R^2 = .31$, $p < .001$); and the traits of *cheerfulness*, *seriousness*, and *bad mood* in the third ($\Delta R^2 = .15$, $p < .001$). Cheerfulness ($\beta = .29$, $p < .001$), *seriousness* ($\beta = .14$, $p = .003$), and *bad mood* ($\beta = -.39$, $p < .001$) were all significant predictors, above the influences of age, gender, personality, and each other. When the second and third steps of the regression analysis were reversed (i.e., the IPIP-junior scales were entered last), the personality traits of the five-factor model did not explain a significant amount of unique variance ($\Delta R^2 = .01$, $p = .341$) in well-being (vs. 14.9% of unique variance explained by the STCI-youth traits, and 34.0% shared variance between the IPIP-junior scales and STCI-youth traits).

We also conducted three separate regression analyses, with demographic variables entered in the first step, the personality traits of the five-factor model in the second, and just one of the SCTI-youth traits (*cheerfulness*, *seriousness*, and *bad mood*, respectively) in the third. Cheerfulness ($\beta = .44$, $\Delta R^2 = .10$, $p < .001$) and *bad mood* ($\beta = -.51$, $\Delta R^2 = .11$, $p < .001$) were significant predictors, while *seriousness* was not ($\beta = -.03$, $\Delta R^2 = .00$, $p = .560$).

Finally, the results of the dominance analysis (see Table 4) revealed that *bad mood* and *cheerfulness* were the most important predictors of well-being, followed by emotional stability. As for humor behaviors, the three STCI-youth traits again explained almost twice the amount of variance (31.0%) of the five personality traits (16.0%).

Discussion

The present study located the traits forming the temperamental basis of adolescents' sense of humor in the nomological of the five-factor model of personality, and it demonstrated that the traits of *cheerfulness*, *seriousness*, and *bad mood* are good predictors of individual differences in everyday humor behaviors and well-being. Broad personality traits show a substantial overlap with the temperamental basis of humor, which is strongest for the trait of *bad mood* and weakest for that of *seriousness*. The trait of *cheerfulness* is primarily predicted by high extraversion, emotional stability, and agreeableness. While these results are generally in line with our expectations and the results of previous studies (Carretero-Dios et al., 2014; Lau, Chiesi, Saklofske, & Yan, 2019; Ruch & Köhler, 1998; Wrench & McCroskey, 2001), it was not predicted that the correlation of *cheerfulness* with agreeableness would be of the same size as that with extraversion. However, "socially warm humor," as measured by the HBQD (Craik, Lampert, & Nelson, 1996), and "affiliative humor," as measured by the HSQ (Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003), are typical of cheerful individuals (Martin et al., 2003; Ruch et al., 2011) and these dimensions overlap with agreeableness (e.g., Mendiburo-Seguel, Páez, & Martínez-Sánchez, 2015), which makes a strong link between cheerfulness and agreeableness plausible.

Seriousness, in turn, is best predicted by conscientiousness and (low) extraversion, which can both also be assumed to facilitate task orientation. Finally, as expected, *bad mood* overlaps strongly with low emotional stability, as well as low extraversion and agreeableness. Thus, the three traits assessed by the STCI-youth all show distinct locations in the personality

space defined by the five-factor model. The fifth factor, labeled "imagination/intellect" in the IPIP-junior, has overall the weakest relationships and seems insignificant for locating *cheerfulness*, *seriousness*, and *bad mood* in the personality space. At first glance, one might be surprised to find that *seriousness*, as a cognitive dimension, is unrelated to intellect/imagination, which describes individual differences in cognitive engagement. However, a closer look reveals that some of the items measuring intellect/imagination in the IPIP-junior pertaining to the tendency to think about abstract ideas (e.g., "I don't feel like thinking about complicated things" [reverse-keyed]), are in fact related to *seriousness*, $r(375) = -.18$, $p < .001$ – in the case of the example item, in the expected direction. However, most of the items refer to other aspects of intellect/imagination, such as creativity (e.g., "I am full of ideas"), which are unrelated to *seriousness*, $r(375) = -.06$, $p = .245$. Given the variety of aspects subsumed under the fifth factor in the five-factor model (for an overview, see DeYoung, 2015), future studies using different measures of the five-factor model personality traits might extend the knowledge on its role in locating the temperamental basis of humor.

Several steps were taken to test the relative contributions of STCI-youth and IPIP-junior to explaining variance in the frequency of everyday humor behaviors. The pattern and size of the correlations between the temperamental basis of humor and the frequency of humor behaviors are generally comparable to those of previous studies with a smaller sample of German-speaking adults (Ruch et al., 2011). The trait of *cheerfulness* has a strong positive correlation with the frequency of humor behaviors, *seriousness* a strong negative correlation, and *bad mood* a weak and non-significant negative correlation. Since HUMOR does not contain any items relating to failure with regard to humor behaviors (e.g., not being able to laugh at oneself, misunderstanding the good-naturedness of humor as ridicule, etc.), the low involvement of negative emotionality (as in the *bad mood* scale) is unsurprising.

The relationships of humor behaviors with the five-factor model personality traits were also as expected, with extraversion yielding a strong positive correlation. In addition, conscientiousness also yielded a medium-strength correlation, underlining the need to demonstrate incremental validity beyond all personality traits of the five-factor model, not only extraversion. Comparing the amount of unique variance explained by the two groups of variables (temperamental basis of humor: 17.0%; five-factor model personality traits: 4.1%), it is concluded that the traits forming the temperamental basis of humor outperform broad personality traits in explaining variance in the frequency of humor behaviors.

The results of the hierarchical regression analyses also indicate that each of the three traits assessed by the STCI-youth contribute to explaining variance in humor behaviors. That is, (high) *cheerfulness*, (low) *seriousness*, and (low) *bad mood* all individually show incremental validity in predicting the frequency of humor behaviors beyond broad personality traits. When entered together, they also each explain additional variance beyond each other. However, the sign of the beta weight associated with *bad mood* changed from negative to positive, which points to the existence of a suppressor situation (e.g., Paulhus, Robins, Trzesniewski & Tracy, 2004). Such a finding should typically not be interpreted before being replicabled, but it appears that *bad mood* – when controlling for the overlap with (low) *cheerfulness* – is correlated with the manifestation of more frequent humor behaviors, as measured by HUMOR, which might hint at a coping function of humor (see Martin & Lefcourt, 1983).

While all three traits assessed by the STCI-youth are proved to be relevant predictors, *cheerfulness* and *seriousness* show the strongest incremental validity beyond broad personality traits; and the dominance analysis reveals that their relative contributions regarding the total HUMOR scale exceed all relative contributions of the broad personality traits. However, not all single humor behaviors are equally predicted by high *cheerfulness*

and low *seriousness*. The behaviors best predicted by high *cheerfulness* include telling jokes and funny stories and laughing about one's own mishaps. This is in line with previous findings linking *cheerfulness* with laughing at oneself, both in self-reports and behavioral measures (Beermann & Ruch, 2011; Ruch & Carrell, 1998). The behaviors best predicted by (low) *seriousness* are light-hearted in nature, such as joking around and acting silly, though they are less closely related to laughing and telling jokes or stories. Other specific humor behaviors, such as the use of irony (Bruntsch & Ruch, 2017), have also previously been linked primarily with low levels of trait *seriousness*. In addition, one behavior ("I laugh and joke as a way to avoid talking about something that is bothering me") was best predicted by (high) *bad mood*.

Collectively, the three traits assessed by the STCI-youth are better predictors of humor behaviors than the personality traits of the five-factor model, both for the total score and for 11 of the 13 individual items (the exceptions were items 8 and 12). Notably, the behaviors most poorly predicted by *cheerfulness*, *seriousness*, and *bad mood* are making fun of other people, which is strongly linked to aggressive humor or "katagelasticism" (see Ruch & Proyer, 2009), and imitating the behavior of others. One might wonder whether this latter item could also have been interpreted by some of the participants as non-humorous.

Certainly, a possible interpretation of these results is that narrower, humor-specific traits are indeed better than broad personality traits at predicting humor-related outcomes. Such knowledge becomes highly relevant when designing interventions. Narrower, humor-specific traits might be better suited than broad personality traits both in terms of which traits to target in an intervention and in terms of how to assess change (see e.g., Hirsch et al., 2010; Ruch & Hofmann, 2017). In addition, they are also potential moderators of an intervention's effectiveness (e.g., Auerbach, 2017). From a different perspective, the present results could also enrich the understanding of the processes by which broad personality traits are linked to

individual differences in humor. Based on the present results, the traits of *cheerfulness*, *seriousness*, and *bad mood* represent candidates for mechanisms that explain why broad personality traits are related to humor behavior.

The present study also underlines the strong relationships between the traits of *cheerfulness* and *bad mood* with well-being. As expected, both have strong associations, which persisted when controlling for the five-factor model personality traits. Interestingly, despite strong correlations with well-being, the five-factor model of personality explains no additional variance in well-being when the traits forming the temperamental basis of humor are entered into the model (unique variance explained by temperamental basis of humor: 14.9%; by the five-factor model personality traits: 0.8%). These results indicate a close connection between *cheerfulness*, *bad mood*, and global well-being, even when the latter is assessed using a measure tapping into cognitive aspects of well-being (satisfaction with different areas of one's life), rather than the prevalence of emotional states.

As expected, seriousness is generally unrelated to well-being. However, when entered simultaneously with *cheerfulness* and *bad mood*, it emerges as a predictor. Again, such results must be taken with caution. In this case, one might speculate that, when the overlap with *bad mood* is controlled for, *seriousness* may be slightly positively associated with well-being, at least with regards to certain domains, such as satisfaction with one's achievements.

Future research could build on the present results to study the incremental validity of the traits forming the temperamental basis of humor above broad personality traits in other outcomes, such as observed humor behavior, with regard to different dimensions (e.g., Ruch & Heintz, 2019) and different aspects of well-being. Future studies could also seek to more systematically distinguish between the types of outcomes predicted by high *cheerfulness* and low *bad mood*, while also taking into account a potential interplay between *cheerfulness*,

seriousness, and *bad mood* in predicting outcomes of interest (e.g., Lau, Chiesi, & Saklofske, 2019).

This is one of the first studies to use the trait version of the STCI-youth (Ruch et al., 2020), a version of the STCI adapted for children and young people. The findings thus provide additional support for the construct validity (convergent and discriminant correlations with broad personality traits were as expected) and the incremental validity of the instrument in explaining variance in humor behaviors and well-being beyond broad personality traits.

Limitations

When interpreting the results of the present study, several limitations must be considered. First, it used a convenience sample, gathered through self-selection by adolescents interested in taking questionnaires, assessing individual differences, and receiving personalized feedback. This sample may differ from others collected in schools, for instance. Second, we used self-report measures to assess the studied variables, leaving them prone to common-method-bias. Of course, third, the study's cross-sectional nature does not allow us to draw conclusions regarding causality or directionality. Fourth, our list of humor behaviors was an age-appropriate sample that had been used in previous research, but it certainly does not cover the full breadth of everyday humor behaviors (e.g., Ruch & Heintz, 2019) and it mixes humor appreciation and production. Future research might build on our results by assessing humor behaviors more comprehensively, using multi-method approaches. Fifth, we used a German translation of the PWI-SC that had not been previously validated. Sixth, we used a sample of German-speaking adolescents to test our hypotheses. Future research could determine the extent to which the results can be generalized to adults and/or other cultures.

Conclusions

Both high *cheerfulness* and low *seriousness* are strong and independent predictors of humor behaviors in everyday life; while well-being is predicted well by *cheerfulness* and *bad mood*. Despite a considerable overlap with broad personality traits, the temperamental basis of humor (*cheerfulness*, *seriousness*, and *bad mood*) showed incremental validity beyond them in predicting how frequently adolescents engage in humor behaviors and how satisfied they are with their lives.

Conflict of interest statement

The authors declare that they have no conflict of interest.

Ethical statement

Informed consent was obtained from each participant included in the study.

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Table 1

Descriptive Statistics, Internal Consistencies, and Correlations With Age and Sex

	M	*SD*	*Sk*	*K*	α	ω	r_{age}	r_{sex}
Temperamental basis of humor *(STCI-youth)*								
Cheerfulness	3.18	0.56	-0.71	0.07	.88	.89	-.07	.11
Seriousness	2.50	0.44	0.01	-0.08	.71	.72	.05	-.11
Bad mood	2.20	0.69	0.46	-0.45	.92	.92	.09	.09
Five-factor model personality *(IPIP-junior)*								
Extraversion	3.20	0.81	-0.19	-0.53	.87	.87	.00	.08
Emotional Stability	3.02	0.78	-0.08	-0.46	.87	.87	-.01	-.15
Conscientiousness	3.47	0.70	-0.22	-0.43	.85	.85	-.03	.10
Agreeableness	4.10	0.66	-1.06	1.21	.90	.90	-.02	.23*
Intellect/Imagination	3.86	0.61	-0.50	0.39	.82	.83	-.02	-.10
Well-being *(PWI-SC)*	7.39	1.79	-1.33	1.77	.86	.86	-.19*	-.01
Humor behaviors *(HUMOR)*								
Humor behaviors (HUMOR total score)	2.93	0.57	-0.20	0.54	.81	.81	.09	.02
I tell memorized jokes that I have heard from other people.	3.19	0.99	-0.09	-0.26			-.09	-.07
I tell funny stories about things that have happened to other people.	3.39	1.03	-0.21	-0.53			.11	.02
I tell funny stories about things that have happened to me.	3.89	0.98	-0.76	0.16			.11	.18*
I joke around by pushing and shoving	2.44	1.12	0.49	-0.56			.04	.02
I play practical jokes	2.67	1.09	0.25	-0.57			.03	-.08
I laugh about upsetting things that have happened to me.	3.67	1.03	-0.68	0.01			.13	.10
I make fun of other people.	2.14	0.96	0.75	0.38			.04	-.04
I laugh and joke as a way to avoid talking about something that is bothering me.	2.65	1.12	0.34	-0.60			.12	-.01
I joke around by teasing.	2.92	1.11	-0.13	-0.73			.12	.02
I act goofy and silly.	2.65	0.99	0.36	-0.17			.01	.11
I laugh at TV or radio programs that I think are funny.	3.40	1.03	-0.43	-0.48			-.05	-.05
I imitate the behavior of others.	2.46	1.03	0.38	-0.34			-.01	.00
I make jokes and laugh when I feel the situation is getting too serious.	2.58	1.12	0.25	-0.68			.07	-.05

Note. $N = 379$. *Sk*=Skewness. *K*=Kurtosis. *CITC*=Minimum and maximum of corrected item-total correlations. α = Cronbach's Alpha; ω = McDonald's Omega, Age: 10 to 17 years. Sex: 0 = male, 1 = female.

* $p < .001$ (two-tailed)

Table 2

Intercorrelations between trait cheerfulness, seriousness, bad mood (STCI-youth), personality traits of the five-factor model (IPIP-junior), and well-being (PWI-SC; partial correlations controlling for influences of age and sex)

	STCI-youth		IPIP-junior					PWI-SC
	SE	BM	E	ES	C	A	I	
STCI-youth								
Cheerfulness (CH)	-.30*	-.71*	.52*	.47*	.18*	.53*	.17	.60*
Seriousness (SE)		.23*	-.29*	-.01	.37*	-.05	.06	-.04
Bad Mood (BM)			-.40*	-.72*	-.30*	-.37*	-.14	-.64*
IPIP-junior								
Extraversion (E)				.31*	.14	.40*	.23*	.36*
Emotional Stability (ES)					.31*	.32*	.17*	.48*
Conscientiousness (C)						.25*	.21*	.29*
Agreeableness (A)							.23*	.37*
Intellect/Imagination (I)								.17*

Note. $N = 379$.
* $p < .001$ (two-tailed)

Table 3

Partial correlations of trait cheerfulness, seriousness, and bad mod (STCI-youth) and five-factor model personality traits (IPIP-junior) with frequency of humor behaviors (HUMOR) controlling for influences of age and sex

	STCI-youth			IPIP-junior				
	CH	SE	BM	E	ES	C	A	I
Humor behaviors (HUMOR total score)	.36*	-.43*	-.07	.31*	-.09	-.21*	.11	.10
I tell memorized jokes that I have heard from other people.	.20*	-.19*	-.04	.22*	-.03	-.09	.08	.16
I tell funny stories about things that have happened to other people.	.28*	-.27*	-.06	.29*	-.05	-.16	.12	.06
I tell funny stories about things that have happened to me.	.44*	-.28*	-.17	.39*	.05	-.06	.28*	.15
I joke around by pushing and shoving	.18*	-.26*	-.07	.17*	-.06	-.10	.06	.00
I play practical jokes	.23*	-.38*	-.10	.23*	-.01	-.21*	.06	.08
I laugh about upsetting things that have happened to me.	.37*	-.33*	-.15	.23*	.07	-.12	.20*	.02
I make fun of other people.	.04	-.14	.06	.13	-.15	-.12	-.12	-.08
I laugh and joke as a way to avoid talking about something that is bothering me.	-.10	-.09	.25*	-.03	-.20*	-.22*	-.08	.01
I joke around by teasing.	.21*	-.29*	-.09	.18*	-.01	-.09	.05	.13
I act goofy and silly.	.21*	-.46*	.00	.06	-.15	-.22*	.01	.00
I laugh at TV or radio programs that I think are funny.	.27*	-.14	-.15	.17	.02	.01	.14	.12
I imitate the behavior of others.	.13	-.14	-.02	.09	-.12	-.08	.04	-.01
I make jokes and laugh when I feel the situation is getting too serious.	.15	-.13	.00	.12	-.02	-.02	-.03	.09

Note. $N = 379$. Age: 10 to 17 years. Sex: 0 = male, 1 = female. CH = Cheerfulness, SE = Seriousness, BM = Bad mood. E = Extraversion, ES = Emotional Stability, C = Conscientiousness, A = Agreeableness, I = Intellect/Imagination.
* $p < .001$ (two-tailed)

Table 4

Results of dominance analyses: Multiple R^2 in linear regression and average contribution (R^2) of single predictors (demographic variables, five-factor model personality traits, and temperamental basis of humor) in predicting the frequency of humor behaviors

	R^2	Demo		IPIP-junior					STCI-youth		
		Age	Sex	E	ES	C	A	I	CH	SE	BM
Humor behaviors (HUMOR total score)	.36	.011	.003	.048	.024	.030	.007	.010	**.107**	.105	.018
I tell memorized jokes that I have heard from other people.	.13	.007	.009	.027	.005	.008	.003	.025	**.028**	.017	.005
I tell funny stories about things that have happened to other people.	.20	.015	.001	.048	.011	.024	.006	.003	**.056**	.031	.010
I tell funny stories about things that have happened to me.	.33	.015	.017	.072	.008	.006	.033	.008	**.119**	.035	.018
I joke around by pushing and shoving	.11	.003	.001	.016	.012	.007	.002	.000	.021	**.041**	.004
I play practical jokes	.20	.001	.011	.026	.003	.035	.003	.007	.028	**.084**	.006
I laugh about upsetting things that have happened to me.	.25	.021	.004	.018	.003	.013	.017	.001	**.096**	.062	.014
I make fun of other people.	.10	.002	.003	**.027**	.018	.006	.022	.004	.007	.009	.004
I laugh and joke as a way to avoid talking about something that is bothering me.	.12	.011	.001	.001	.014	.027	.002	.003	.007	.008	**.046**
I joke around by teasing.	.14	.018	.000	.012	.004	.006	.002	.016	.025	**.056**	.004
I act goofy and silly.	.30	.001	.006	.007	.026	.021	.003	.001	.059	**.165**	.015
I laugh at TV or radio programs that I think are funny.	.10	.001	.006	.008	.008	.001	.005	.011	**.045**	.008	.011
I imitate the behavior of others.	.07	.000	.001	.004	**.024**	.004	.001	.000	.019	.008	.004
I make jokes and laugh when I feel the situation is getting too serious.	.09	.006	.004	.007	.002	.001	.011	.009	**.031**	.009	.009
Well-being (PWI-SC)	.50	.026	.001	.031	.065	.024	.033	.007	.137	.009	**.164**

Note. $N = 379$. Age: 10 to 17 years. Sex: 0 = male, 1 = female. E = Extraversion. ES = Emotional Stability. C = Conscientiousness. A = Agreeableness. I = Intellect/Imagination. CH = Cheerfulness. SE = Seriousness. BM = Bad mood. Bold = strongest predictor.